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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/904,875	07/16/2001	Takamitsu Asanuma	110108	1757

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EXAMINER

NGUYEN, TU MINH

ART UNIT	PAPER NUMBER
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3748

8

DATE MAILED: 05/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/904,875

Applicant(s)

Asanuma et al.

Examiner

Tu M. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Apr 30, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☒ The proposed drawing correction filed on Apr 30, 2002 is: a) ☒ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

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DETAILED ACTION

1. An Applicant's Amendment filed on April 30, 2002 has been entered.

Claims 1 and 5 have been amended. Overall, claims 1-6 are pending in this application.

Drawings

2. The amended drawings filed on April 30, 2002 have been approved for entry. Upon allowance of this application, formal drawings with the approved changes must be submitted.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 5 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Maaseidvaag et al. (U.S. Patent 6,167,696).

Re claim 5, as shown in Figures 1 and 4, Maaseidvaag et al. disclose a device for purifying the exhaust gas of an internal combustion engine, comprising:

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- a particulate filter (22) arranged in the exhaust system, which carries an oxidation catalyst (54) (lines 33-39 of column 6) for absorbing NO_x when the air-fuel ratio is lean and releasing the absorbed NO_x when the air-fuel ratio is stoichiometric or rich (during a warm mode, NO_x in the exhaust gas is stored in the catalyst when the engine air-fuel ratio is lean (step 165), and when an amount of NO_x stored in the catalyst exceeds a threshold value (step 166 with Y answer), the engine operation is switched to fuel rich or stoichiometry to purge and reduce the stored NO_x); and

- a catalytic apparatus (16) for purifying NO_x (lines 32-38 of column 2) arranged in the exhaust system upstream of the particulate filter.

Re claim 6, in the device of Maaseidvaag et al., the particulate filter (22) carries an oxygen absorbing agent (the precious metals platinum and rhodium carried by the particulate filter (22) are oxygen absorbing and releasing agents).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeshima et al. (U.S. Patent 5,473,890) in view of Maaseidvaag et al.

Re claim 1, as shown in Figure 23, Takeshima et al. disclose a device for purifying the exhaust gas of an internal combustion engine, comprising:

- a NOx absorber (19) arranged in the exhaust system, which carries a catalyst (platinum and an alkali metal (lines 30-55 of column 4)) for absorbing and reducing NOx, the catalyst absorbing NOx when the air-fuel ratio in the surrounding atmosphere thereof is lean and releasing the absorbed NOx to purify NOx by reduction when the air-fuel ratio is stoichiometric or rich; and
- a catalytic apparatus (18), which carries the catalyst for absorbing and reducing NOx, for purifying NOx arranged in the exhaust system upstream of the NOx absorber (since the catalytic apparatus (18) also carries a noble metal (platinum) and at least an alkali metal (barium) as a NOx and SOx absorbent material, it is obvious that the catalytic apparatus can also absorb and reduce NOx).

Takeshima et al., however, fail to disclose that the NOx absorber can also function as a particulate filter.

As shown in Figures 1 and 4, Maaseidvaag et al. teach that it is conventional in the art to use a NOx trap (22) that includes an integral particulate filter to trap soot in the exhaust gas. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the NOx trap taught by Maaseidvaag et al. in the device of Takeshima et al., since the use thereof would have provided an effective means to eliminate soot from the exhaust gas of internal combustion engines.

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Re claim 2, the modified device of Takeshima et al. further comprises bypassing means (27) to make possible the exhaust gas bypass the NOx trap located downstream of the catalytic apparatus (18).

Re claim 3, in the modified device of Takeshima et al., the catalytic apparatus (18) carries the catalyst (platinum, barium) for absorbing and reducing NOx (see lines 36-41 of column 7), and during the recovery process of the SOx pollution of the catalytic apparatus (18), the bypassing means (27) makes the exhaust gas bypass the NOx trap (see Figure 30).

Re claim 4, in the modified device of Takeshima et al., the catalytic apparatus (18) carries the catalyst (platinum, barium) for absorbing and reducing NOx, and immediately after the finishing of the recovery process of the SOx pollution of the catalytic apparatus (18), the bypassing means (27) does not make the exhaust gas bypass the NOx trap and thus the exhaust gas passes through the NOx trap, as clearly shown in Figure 30.

7. Claims 1-4 are further rejected under 35 U.S.C. 103(a) as being unpatentable over Dou et al. (U.S. Patent Application Publication 2001/0035006) in view of Maaseidvaag et al.

Re claim 1, as depicted in Figure 17, Dou et al. disclose a device for purifying the exhaust gas of an internal combustion engine, comprising:

- a particulate filter (6) arranged in the exhaust system;
- a NOx adsorber (4) carries a catalyst for absorbing and reducing NOx, the catalyst absorbing NOx when the air-fuel ratio in the surrounding atmosphere thereof is lean and releasing the absorbed NOx to purify NOx by reduction when the air-fuel ratio is stoichiometric or rich; and

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- a catalytic apparatus (3), which carries the catalyst for absorbing and reducing NO_x, for purifying NO_x arranged in the exhaust system upstream of the particulate filter (see paragraphs 0039, 0041, and 0042).

Dou et al., however, fail to disclose that the particulate filter and the NO_x absorber can be combined into one single housing.

As shown in Figures 1 and 4, Maaseidvaag et al. teach that it is conventional in the art to use a NO_x trap (22) that includes an integral particulate filter and a NO_x absorbent washcoat (54). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have used the NO_x trap taught by Maaseidvaag et al. in the device of Dou et al. to replace the particulate filter and the NO_x adsorber, since the use thereof would have provided a device with lower complexity since there are fewer attachments required for one housing.

Re claim 2, the modified device of Dou et al. further comprises bypassing means (5A) to make possible the exhaust gas bypass the NO_x trap located downstream of the catalytic apparatus (3).

Re claim 3, in the modified device of Dou et al., the catalytic apparatus (3) carries the catalyst (noble metals, barium) for absorbing and reducing NO_x (see paragraph 0039), and during the recovery process of the SO_x pollution of the catalytic apparatus, the bypassing means (5A) makes the exhaust gas bypass the NO_x trap (see the last 8 lines of paragraph 0062).

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Re claim 4, in the modified device of Dou et al., the catalytic apparatus (3) carries the catalyst (noble metals, barium) for absorbing and reducing NO_x, and immediately after the finishing of the recovery process of the SO_x pollution of the catalytic apparatus, the bypassing means (5A) does not make the exhaust gas bypass the NO_x trap and thus the exhaust gas passes through the NO_x trap.

Response to Arguments

8. Applicant's arguments with respect to the references applied in the previous Office Action have been considered but are they are not persuasive.

In response to applicant's argument that Maaseidvaag et al. fail to disclose or suggest each and every feature of the claimed invention in the pending application (page 6 of Applicant's Amendment), the examiner respectfully disagrees. As illustrated in Figures 1 and 4, Maaseidvaag et al. clearly discloses a particulate filter (22) carrying an oxidation catalyst (washcoat (54)) (the washcoat includes a precious metal and an alkali metal) for absorbing and reducing NO_x, the catalyst absorbing NO_x when the air-fuel ratio in the surrounding atmosphere is lean and releasing the absorbed NO_x to purify NO_x by reduction when the air-fuel ratio is stoichiometric or rich (during a warm mode, NO_x in the exhaust gas is stored in the catalyst when the engine air-fuel ratio is lean (step 165), and when an amount of NO_x stored in the catalyst exceeds a threshold value (step 166 with Y answer), the engine operation is switched to fuel rich or stoichiometry to purge and reduce the stored NO_x), and a catalytic apparatus (16) for purifying NO_x (lines 32-38 of column 2) arranged in the exhaust system upstream of the particulate filter.

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In response to applicant's argument that the NOx trap (22) in Maaseidvaag et al. fails to trap and oxidize the particulate matter in the exhaust gas (page 6 of Applicant's Amendment), the examiner again respectfully disagrees. As indicated throughout the text, the NOx trap (22) of Maaseidvaag et al. also includes an integral particulate filter; and as shown in Figure 5, if an amount of particulate matter (PM_CUM) is greater than a threshold value (step 506 with a Y answer), a regeneration cycle is initiated to burn off the trapped particulate matter.

Applicant further argues that at low temperature, the three-way catalyst (16) and the NOx trap (22) in Maaseidvaag et al. fail to work properly (i.e. at low temperature, the three-way catalyst (16) does not effectively purify NOx in the exhaust gas; and the NOx trap has low NOx absorption efficiency) (page 6 of Applicant's Amendment). The examiner respectfully disagrees with this narrowly focused type of argument because at low temperature, even the upstream catalytic apparatus (74) and the particulate filter (70) in the pending application will not function properly either. Moreover, from Figure 2B, Maaseidvaag et al. detail the operation of their device during a warm mode in which the exhaust gas temperature is sufficiently high for the three-way catalyst to oxidize or reduce NOx, CO, and HC in the exhaust gas and for the NOx trap to have relatively high NOx absorption efficiency.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Communication

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623. The fax phone number for this group is (703) 308-7763.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1148.

TMN

May 3, 2002

Tu M. Nguyen

Tu M. Nguyen

Patent Examiner

Art Unit 3748

Thomas Denion

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